

AMENDMENTS TO THE DRAWINGS

Applicants have prepared formal drawings that address the objection to the drawings cited in the Office Action. The Examiner is kindly requested to indicate acceptance of the drawings in the next Office Action.

Attachment:

Replacement Sheets

REMARKS

Claims 1-40 are all the claims pending in the application. Claims 18, and 36-39 have been allowed. The Examiner has indicated that claims 3-6, 10, 11, 20, 22-27, and 30 include patentable subject matter.

Claim Rejections - 35 U.S.C. § 103(a)

Claims 1, 2, 7-9, 12, 14, 15, 21, 28, 29, 32, 33 and 40 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Figure 11 of the present application in view of Tal et al. (US Patent No. 6,400,782) (Tal). With regards to claim 1, the Examiner states that Figure 11 of the present invention includes all of the features of claim 1 except for a reference symbol that comprises an analytic tone located in only one subchannel of said reference symbol.

Regarding the claimed analytic tone, the Examiner alleges that Tal explicitly discloses such a reference symbol comprising an analytic tone located in only one subchannel of said reference symbol (citing col. 9 line 33 - col. 10 line 28; and Fig. 10: channel #1 and block 230).

Applicants respectfully traverse this rejection. The present invention relates to a multiplexing method, and the use of an analytic tone to calculate the timing offset and frequency offset estimations in an OFDM system. The Examiner acknowledges that Figure 11 of the present invention is silent with respect to this analytic tone feature. As such, the Examiner must find the motivation or teaching for the combination of the two references in Tal.

Applicants note that whether an invention is patentable may depend on the discovery of the problem. *In re Spinnoble*, 405 F.2d 578, 585, 160 USPQ 237, 243 (CCPA 1969) (“[A] patentable invention may lie in the discovery of the source of a problem even though the remedy may be obvious once the source of the problem is identified. This is part of the ‘subject matter as a whole’ which should always be considered in determining the obviousness of an invention under 35 U.S.C. 103.”). In the present case, neither Figure 11 of the present application nor Tal identify the problem that the present invention solves. In particular, Tal relates to frequency domain filtering that does not require a Hilbert transform. As such, the filtering techniques disclosed in Tal and the problem solved (not requiring the use of a Hilbert transform) are quite different than the multiplexing problems solved by the present invention. Therefore, one of ordinary skill in the art would not have been motivated to look to Tal for use of an analytic tone.

Further, the Examiner’s citation of col. 9 line 33 - col. 10 line 28 also does not disclose the claimed analytic tone. Rather this section discusses a frequency domain filter (see col. 9, lines 27-30). With regards to the analytic transform, Tal states that it is well known in the art that in the case of real time domain signals, zeroing of the negative frequency components is equivalent to a real to analytic transform (see col. 10, lines 11-15). Thus, the filtering method of Tal and its analytic transform are quite different than the analytic tone as claimed. Accordingly, Applicants respectfully submit that claim 1 is allowable.

With regards to claim 8, the Examiner acknowledges that Figure 11 of the present invention fails to explicitly disclose the claimed feature that (N-a2) samples are generated in a moving sum in accordance with said mixer output, and N represents a total number of subcarriers

and a_2 represents a frequency offset estimation interval. However, the Examiner states that Figure 11 explicitly shows a moving sum (citing Fig. 11: block 59) having $N/2$ samples. The Examiner states that the only difference between claim 8 and Figure 11 is $N/2$ compared to $N-a_2$. As such, the Examiner concludes that at the time of the invention, it would have been obvious to a person of ordinary skill in the art to implement such a moving sum to the Admitted Prior Art since " $N/2$ " can be equal to " $N-a_2$ " if " a_2 " is equal to " $N/2$ ".

Applicants respectfully traverse this rejection. First, taking the Examiner's statement, and substituting $N/2$ for " a_2 " leaves the equation " $N-N/2$ ". This expression is not claimed. Further, Figure 11 of the present application teaches a two-step OFDM technique that uses both course and fine synchronization, while the present invention uses a single step process that includes an analytic tone. Thus, it would not have been obvious to just substitute any subcarrier and frequency offset estimation terminal since the present invention extends frequency offset in a single step. Accordingly, claim 8 is allowable for this reason as well.

Claims 13, 16, 17, 19, 31, 34 and 35 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Figure 11, in view of Tal and further in view of Raphaeli et al. (US Patent No. 6,614,864). These claims are allowable at least based on the lack of motivation to combine Tal and Figure 11 of the present invention for the reasons discussed above. The deficiencies in this lack of motivation are not made up for by Raphaeli et al.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

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CUSTOMER NUMBER

Date: April 8, 2005